

NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD

PASTURE AND HAY PLANTING  
(Acre)  
CODE 512

**DEFINITION**

Establishing and re-establishing or renovating native or introduced forage species.

**PURPOSES**

This practice may be applied as part of a conservation management system to accomplish one or more of the following purposes:

- Establish adapted and compatible species, varieties, or cultivars
- Improve or maintain livestock nutrition and/or health
- Extend the length of the grazing season
- Reduce soil erosion caused by wind and/or water
- Improve or enhance wildlife habitat.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice may be applied on cropland, hayland, pastureland, and other agricultural lands.

**CRITERIA**

Criteria are established for:

- plant species selection
- site preparation
- lime and fertilizer
- seeds and sprigs
- pest management
- planting.

**Plant Species Selection Criteria**

Plant species selection shall be made from Appendices A.1 - A.3. In addition, selection shall be made based upon:

- Needs and desires of the land user
- Adaptability to the soil and climate
- Plant compatibility with other forage species and their selected cultivar(s) in rate of establishment, maturity, and growth/habit when seeded together as a forage mixture
- Plant resistance to disease and insects common to the site or location.

### Site Preparation Criteria

Sites should be selected far enough in advance to allow for preparation activities. Site preparation (including removal of rocks, stumps and other obstructions) shall be the minimum necessary to ensure close contact of seeds or sprigs with the soil and to ensure safe and efficient operation of equipment. *Where practical, establishment methods such as sod seeding or no-till are preferred.* Where conventional tillage seedbed preparation is necessary, prepare the seedbed across the dominant slope.

Drainageways for surface water shall be left undisturbed where vegetation is or can be made adequate.

### Lime and Fertilizer Criteria

Lime and fertilizer shall be applied in accordance with soil test recommendations. *For more information about nutrient management, consult the Field Office Technical Guide, Section IV, Nutrient Management (Code 590).*

### Seeds and Sprigs Criteria

Seed shall conform to the seed laws and regulations of North Carolina.

Legume seeds shall be treated with an appropriate inoculant at planting time or, viable pre-inoculated seeds may be used.

*Seeds, particularly warm season perennial grass seeds, should be acquired in ample time to perform germination testing prior to planting. It is always best to send a sample of seeds to the North Carolina Department of Agriculture and Consumer Services (NCDA & CS) Seed Testing Lab; however, a fairly simple procedure, the ragdoll germination test (Appendix A.4) can be conducted to get an indication of potential germination of seeds.*

### Pest Management Criteria

For control of pests (*i.e., insects and weeds*) at planting, consult the Field Office Technical Guide, Section IV, Pest Management (Code 595).

### Planting Criteria

Planting rates, depths and dates will be based on those listed in Appendices A.1. - A.3.

Calibrate seeding equipment before planting. Operate planting equipment in accordance with manufacturer's instructions. Planting shall be on the contour or across the predominate slope. Concentrated flow areas should be evaluated for the need to include a nurse crop of small grains in the seed mixture. The seeding rate of any small grain nurse crops planted with a seeding mixture for pasture or hay shall not be more than 50% of the rate normally used when planting the small grain alone.

### CONSIDERATIONS

Where wildlife habitat management is an objective, the food and cover value of the planting can be enhanced by using an approved habitat evaluation procedure to aid in selecting plant species and providing for other habitat requirements necessary to achieve the objective.

## PLANS AND SPECIFICATIONS

Plans and specifications will be prepared for each site where Pasture and Hay Planting will be applied. Plans and specifications will be based on this practice standard and may include narratives, maps, drawings, fact sheets or other similar documents. These documents will contain the following information, as a minimum:

- each area identified where Pasture and Hay Planting will be applied
- species to be planted
- planting rate
- planting depth
- planting date.

## OPERATION AND MAINTENANCE

Growth of seedlings or sprigs shall be monitored for stress (*e.g., water stress, shading, nutrient stress, freeze damage, diseases, or weeds*). Evaluate the stress and take appropriate measures to correct. Replanting may be necessary. Stand success shall be determined using Appendix A.5 as a guide.

Newly seeded areas should be protected from grazing until plants are well established. Once established, stands to be used for grazing and/or haying should be planned using the Field Office Technical Guide standards, Prescribed Grazing (Code 528A) and/or Forage Harvest Management (Code 511).

## REFERENCES

Ball, D.M., C.S. Hoveland and G.D. Lacefield. "Southern Forages". 1991. Potash and Phosphate Institute, Norcross, GA.

Capel, Stephen. "Native Warm Season Grasses for Virginia and North Carolina Benefits for Livestock and Wildlife". 1995. Virginia Department of Game & Inland Fisheries.

Chamblee, Douglas S. (ed.) and James T. Green, Jr. (assoc. ed.) "Production and Utilization of Pastures and Forages in North Carolina". January, 1995. North Carolina Agricultural Research Service and North Carolina State University, Technical Bulletin 305, Raleigh, NC.

North Carolina Agricultural Chemicals Manual. 1997. College of Agricultural and Life Sciences. North Carolina State University, Raleigh, NC.

North Carolina Field Office Technical Guide, Section IV. Pasture and Hay Planting (Code 512). August 1994. USDA-NRCS, Raleigh, NC.

South Carolina Field Office Technical Guide, Section IV. Pasture and Hay Planting (Code 512). August 1986. USDA-NRCS, Columbia, SC.

USDA-NRCS. National Range and Pasture Handbook. September 1997. Grazing Lands Technology Institute.

Wolf, Dale D. and David A. Fiske. "Planting and Managing Switchgrass for Forage, Wildlife and Conservation". 1995. Virginia Cooperative Extension, Publication 418-013.

## PASTURE AND HAY PLANTING

APPENDICES

<u>Appendix</u>	<u>Title</u>	<u>Page Number</u>
A.1.	General Planting Guidelines for: GRASSES. ....	512-5
A.2.	General Planting Guidelines for: LEGUMES. ....	512-7
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Species	Planting Rate (lbs/ac)		Depth to Plant (inches)	Recommended Planting Dates <sup>1</sup> (by Major Land Resource Area)		
	Broadcast	Drill		130 (Mountains)	136 (Piedmont)	137,133A,153A,153B <sup>2</sup> (Coastal Plain)
PERENNIAL, COOL SEASON						
Kentucky Bluegrass	10-15	8-12	1/4	07/25 - 08/10	Not Adapted.	Not Adapted.
Orchardgrass <sup>3</sup> (Fall Planted)	12-15	8-12	1/4 - 1/2	07/25 - 08/10	08/25 - 09/15	Not Adapted.
Orchardgrass <sup>3</sup> (Spring Planted) <sup>4</sup>	12-15	8-12	1/4 - 1/2	03/20 - 04/20	02/15 - 03/31	Not Adapted.
Reed Canarygrass (Fall Planted)	5-10	4-8	1/4 - 1/2	07/25 - 08/10	08/25 - 09/15	Not Adapted.
Reed Canarygrass (Spring Planted)	5-10	4-8	1/4 - 1/2	03/20 - 04/20	03/01 - 03/31	Not Adapted.
Rescuegrass <sup>5</sup> (Fall Planted)	25-35	20-25	1/2 - 3/4	08/20 - 09/07	09/01 - 09/15	09/01 - 09/30
Rescuegrass <sup>5</sup> (Spring Planted)	25-35	20-25	1/2 - 3/4	03/15 - 03/30	03/01 - 03/30	Not Recommended.
Ryegrass, Perennial	15-20	10-15	1/4 - 1/2	07/25 - 08/10	08/25 - 09/15	09/01 - 09/30
Tall Fescue <sup>6</sup> (Fall Planted)	15-20	10-15	1/4 - 1/2	07/25 - 08/10	08/25 - 09/15	09/01 - 09/30
Tall Fescue <sup>6</sup> (Spring Planted) <sup>4</sup>	15-20	10-15	1/4 - 1/2	03/20 - 04/20	02/15 - 03/31	02/15 - 03/20
Timothy (Fall Planted)	10-12	8-10	1/4 - 1/2	07/25 - 08/10	Not Adapted.	Not Adapted.
Timothy (Spring Planted)	10-12	8-10	1/4 - 1/2	03/20 - 04/20	Not Adapted.	Not Adapted.
PERENNIAL, WARM SEASON						
Bahiagrass, Pensacola <sup>7</sup>	15-25	10-20	1/4 - 1/2	Not Adapted.	03/15 - 05/01	02/15 - 03/15
Bahiagrass, Tifton 9 <sup>7</sup>	15-25	10-20	1/4 - 1/2	Not Adapted.	03/15 - 05/01	02/15 - 03/15
Bermudagrass, Common	6-8	5-7	1/4 - 1/2	Not Adapted.	04/15 - 05/15	04/01 - 05/15
Bermudagrass, Hybrid <sup>8</sup>	25-40 bushels	5-15 bushels	1-3	Not Adapted.	03/01 - 03/31	03/01 - 03/31
Bluestem, Big	10-12 PLS	8-10 PLS	1/4 - 1/2	05/25 - 06/15	05/07 - 05/20	05/01 - 05/15
Bluestem, Caucasian	4 PLS	2 PLS	1/4	05/25 - 06/15	05/07 - 05/20	05/01 - 05/15
Dallisgrass	20-30	15-20	1/4 - 1/2	Not Adapted.	Not Adapted.	03/01 - 03/30
Eastern Gamagrass <sup>9</sup>	---	8-10	3/4 - 1	05/25 - 06/15	05/07 - 06/07	05/01 - 05/15
Flaccidgrass (seed)	---	2-4	1/4 - 1/2	05/25 - 06/15	05/07 - 05/20	05/01 - 05/15
Flaccidgrass (sprigs)	3 to 5 per ft in 18" rows		2-3	03/01 - 04/07	02/20 - 03/15	02/15 - 03/15
Flaccidgrass (tillers)	6 to 8 per ft	---	root cover	05/15 - 06/15	04/25 - 06/01	04/20 - 05/20
Indiangrass <sup>9</sup>	10-12	8-10	1/4 - 1/2	05/25 - 06/15	05/07 - 05/20	05/01 - 05/15
Switchgrass <sup>9</sup>	---	6-10	1/2	05/07 - 06/07	05/07 - 06/30	05/07 - 06/30

Species	Planting Rate (lbs/ac)		Depth to Plant (Inches)	Recommended Planting Dates <sup>1</sup> (by Major Land Resource Area)		
	Broadcast	Drill		130 (Mountains)	136 (Piedmont)	137,133A,153A,153B <sup>2</sup> (Coastal Plain)
ANNUALS, WINTER						
Barley	140	100	1-2	08/01 - 08/20	08/25 - 09/15	Not Adapted
Oats	130	100	1-2	Not Adapted.	08/25 - 09/15	09/05 - 09/30
Rye	120	100	1-2	08/01 - 08/20	08/25 - 09/15	09/05 - 09/30
Ryegrass, Annual (Italian)	30-40	20-30	1/4 - 1/2	07/25 - 08/10	08/25 - 09/15	09/01 - 09/30
Wheat	120	100	1-2	08/01 - 08/20	08/25 - 09/15	09/05 - 09/30
ANNUALS, SUMMER						
Crabgrass	3 - 5 PLS	3 - 5 PLS	1/4 - 1/2	05/15 - 05/31	05/01 - 05/31	05/01 - 05/31
Millet, Browntop	15-20	10-15	1/2 - 1	05/15 - 05/31	05/01 - 05/31	05/01 - 05/15
Millet, Foxtail	15-20	10-15	1/2 - 1	05/15 - 05/31	05/01 - 05/31	05/01 - 05/15
Millet, German	15-20	10-15	1/2 - 1	05/15 - 05/31	05/01 - 05/31	05/01 - 05/15
Millet, Japanese	15-20	10-15	1/2 - 1	05/15 - 05/31	05/01 - 05/31	05/01 - 05/15
Millet, Pearl (Dwarf)	20-25	15-20	1/2 - 1	05/15 - 05/31	05/01 - 05/31	05/01 - 05/15
Millet, Pearl (Tall)	25-30	15-30	1/2 - 1	05/15 - 05/31	05/01 - 05/31	05/01 - 05/15
Sorghum-Sudan Hybrids <sup>10</sup>	35-40	20-30	1/2 - 1	05/15 - 05/31	05/01 - 05/31	05/01 - 05/15
Sorghum, Forage (silage) <sup>10</sup>	---	4-6 in 30+ inch rows	1/2 - 1	05/15 - 05/31	05/01 - 05/31	05/01 - 05/15
Sudangrass <sup>10</sup>	30-40	20-25	1/2 - 1	05/15 - 05/31	05/01 - 05/31	05/01 - 05/15
OVERSEEDING BERMUDAGRASS <sup>11</sup>						
+Rye	110	90	1-2	Not Adapted.	08/25 - 09/15	09/05 - 09/30
+Ryegrass, Annual	30	20	1/4 - 1/2	Not Adapted.	08/25 - 09/15	09/01 - 09/30
+Rye +Ryegrass, Annual	110 + 30	90 + 20	1/4 - 1/2	Not Adapted.	08/25 - 09/15	09/05 - 09/30

**Notes:**

<sup>1</sup> Actual dates may vary depending upon establishment method (e.g., conventional vs. sod seeding), soil moisture and soil temperature.

<sup>2</sup> For the black, heavy-textured soils in the Tidewater Region (MLRA #153B), use dates for the Piedmont (MLRA #136).

<sup>3</sup> Best on moist, fertile soils. Not suited to infertile, droughty, sandy soils.

<sup>4</sup> Frost seedings should not be made after February 15 in Coastal Plain; March 1 in Piedmont; and March 15 in Mountains.

<sup>5</sup> Typically acts as a biennial in North Carolina. To maintain stands, allow natural reseeding each summer.

<sup>6</sup> If seed with 5% or less endophyte ("endophyte free") are used, palatability and animal performance may improve. However, stand losses may occur when adverse conditions (e.g., drought, overgrazing) are present.

<sup>7</sup> Adapted south of line from Rockingham, NC to Washington, NC.

<sup>8</sup> Use freshly dug, moist sprigs. Plant in moist soil and keep free of competition.

<sup>9</sup> Species recommended for grassland wildlife management.

<sup>10</sup> Not recommended for grazing by horses.

<sup>11</sup> Bermudagrass should be grazed or clipped closely before attempting to overseed.

PLS - Pure Live Seed; %PLS = %purity X %germination.

Species	Planting Rate (lbs/ac)		Depth to Plant (inches)	Recommended Planting Dates <sup>2</sup> (by Major Land Resource Area)		
	Broadcast	Drill		130 (Mountains)	136 (Piedmont)	137,133A,153A,153B <sup>3</sup> (Coastal Plain)
PERENNIALS, COOL SEASON						
Alfalfa (Fall Planted)	20-25	15-20	1/4	07/25 - 08/10	08/25 - 09/15	09/01 - 09/30
Alfalfa (Spring Planted)	20-25	15-20	1/4	03/01 - 04/07	03/01 - 03/31	Not Recommended.
Clover, Red (Fall Planted)	10-15	8-10	1/4	07/25 - 08/10	08/25 - 09/15	09/01 - 09/30
Clover, Red (Spring Planted) <sup>4</sup>	10-15	8-10	1/4	03/01 - 05/15	02/15 - 03/30	02/15 - 03/20
PERENNIALS, WARM SEASON						
Lespedeza, Sericea (scarified)	20-40	15-30	1/4 - 1/2	03/15 - 04/15	03/01 - 03/20	03/01 - 03/20
Lespedeza, Sericea (unscarified)	50-60	45-50	1/4 - 1/2	09/01 - 03/31	09/15 - 02/26	10/01 - 02/25
ANNUALS, WINTER						
Clover, Crimson	20-25	15-20	1/4 - 1/2	07/25 - 08/10	08/25 - 09/15	09/01 - 09/30
ANNUALS, SUMMER						
Lespedeza, Kobe	30-40	Not Recommended.	1/4 - 1/2	03/15 - 03/31	02/10 - 02/28	02/01 - 02/20
Lespedeza, Korean	20-30	Not Recommended.	1/4 - 1/2	03/15 - 03/31	02/10 - 02/28	02/01 - 02/20

**Notes:**

<sup>1</sup> Use inoculant or viable pre-inoculated seeds.

<sup>2</sup> Actual dates may vary depending upon establishment method (e.g., conventional vs. sod seeding), soil moisture and soil temperature.

<sup>3</sup> For the black, heavy-textured soils in the Tidewater Region (MLRA #153B), use dates for the Piedmont (MLRA #136).

<sup>4</sup> Frost seedings should not be made after February 15 in Coastal Plain; March 1 in Piedmont; and March 15 in Mountains.

Species	Planting Rate (lbs/ac)		Depth to Plant (Inches)	Recommended Planting Dates <sup>1</sup> (by Major Land Resource Area)		
	Broadcast	Drill		130 (Mountains)	136 (Piedmont)	137,133A,153A,153B <sup>2</sup> (Coastal Plain)
Kentucky Bluegrass + White Dutch Clover	10 + 5	8 + 5	1/4	07/25 - 08/10	Not Adapted.	Not Adapted.
Orchardgrass + Alfalfa (Fall Planted)	5 + 20	3 + 15	1/4	07/25 - 08/10	08/25 - 09/15	Not Adapted.
Orchardgrass + Alfalfa (Spring Planted)	5 + 20	3 + 15	1/4	03/20 - 04/20	Not Recommended.	Not Adapted.
Orchardgrass+ Clover, Ladino (Fall Planted)	12 + 4	9 + 3	1/4	07/25 - 08/10	08/25 - 09/15	Not Adapted.
Orchardgrass+ Clover, Ladino (Spring Planted) <sup>3</sup>	12 + 4	9 + 3	1/4	03/20 - 04/20	02/15 - 03/31	Not Adapted.
Orchardgrass + Clover, Red (Fall Planted)	12 + 10	9 + 8	1/4	07/25 - 08/10	08/25 - 09/15	Not Adapted.
Orchardgrass + Clover, Red (Spring Planted) <sup>3</sup>	12 + 10	9 + 8	1/4	03/20 - 04/20	02/15 - 03/31	Not Adapted.
Orchardgrass + Tall Fescue (Fall Planted)	12 + 15	10 + 12	1/4	07/15 - 08/10	08/15 - 09/15	Not Adapted.
Orchardgrass + Tall Fescue (Spring Planted)	12 + 15	10 + 12	1/4	03/01 - 04/20	02/01 - 03/31	Not Adapted.
Orchardgrass + Clover, Ladino + Tall Fescue (Fall Planted)	12+5+15	10+3+12	1/4	07/25 - 08/10	08/25 - 09/15	Not Adapted.
Orchardgrass + Clover, Ladino + Tall Fescue (Spring Planted) <sup>3</sup>	12+5+15	10+3+12	1/4	03/20 - 04/20	03/01 - 03/31	Not Adapted.
Orchardgrass + Clover, Red + Tall Fescue (Fall Planted)	12+10+15	10+8+12	1/4	07/25 - 08/10	07/25 - 08/10	Not Adapted.
Orchardgrass + Clover, Red + Tall Fescue (Spring Planted) <sup>3</sup>	12+10+15	10+8+12	1/4	03/01 - 04/20	03/31 - 03/31	Not Adapted.
Rye + Ryegrass, Annual	100 + 25	10+3+12	1/2	08/01 - 08/10	08/25 - 09/15	09/05 - 09/30
Tall Fescue + Clover, Ladino (Fall Planted)	15 + 4	12 + 3	1/4	07/25 - 08/10	08/25 - 09/15	09/01 - 09/30
Tall Fescue + Clover, Ladino (Spring Planted) <sup>3</sup>	15 + 4	12 + 3	1/4	03/20 - 04/20	02/15 - 03/31	02/15 - 03/20
Tall Fescue + Clover, Red (Fall Planted)	12 + 8	10 + 7	1/4	07/25 - 08/10	08/25 - 09/15	09/01 - 09/30
Tall Fescue+ Clover, Red (Spring Planted) <sup>3</sup>	12 + 8	10 + 7	1/4	03/20 - 04/20	02/15 - 03/31	02/15 - 03/20
Timothy + Clover, Red (Fall Planted)	5-8 + 8-12	4-7 + 7-11	1/4 - 1/2	08/01 - 09/30	Not Adapted.	Not Adapted.
Timothy + Clover, Red (Spring Planted) <sup>3</sup>	5-8 + 8-12	4-7 + 7-11	1/4 - 1/2	03/01 - 09/15	Not Adapted.	Not Adapted.

**Notes:**

<sup>1</sup> Actual dates may vary depending upon establishment method (e.g. conventional vs. sod seeding), soil moisture and soil temperature.

<sup>2</sup> For the black, heavy-textured soils in the Tidewater Region (MLRA #153B), use dates for the Piedmont (MLRA #136).

<sup>3</sup> Frost seedings should not be made after March 15 in Mountains, March 1 in Piedmont, and February 15 in Coastal Plains.



#### **A.4. Ragdoll Germination Test.**

- Use a firm paper towel such as a brown hand towel or equivalent. The soft, very absorbent paper towels often used in a kitchen make poor ragdolls because they allow roots and shoots to penetrate into the fiber, making seedlings difficult to remove during counting. If no other type of towel is available, the soft towel can be used, but it is best to use two layers. These towels often hold too much water which drowns the seeds.
- Wet the towel and allow free water to drip off for a minute. Lay the wet towel flat.
- Count out 100 seeds (50 for larger seeds like corn, peanuts, and soybeans) and place them on one half of the towel. Fold the towel in half and roll into a moderately tight tube. Rolling it around a pencil works well. Place the tube in a jar or sealable plastic bag. *To test the procedure, always place 5-10 seeds of some species you know will germinate such as beans, corn, alfalfa or clover.*
- Position the ragdoll so the tube is upright. Doing this causes roots to grow down and shoots to grow upward so that seedlings are more easily removed during counting. The ragdoll should be kept in a warm place (between 75 and 85° F). A little water in the bottom of the jar or plastic bag will insure adequate moisture.
- Make the first germination count for most seeds in about three days. Open the towel and count the seedlings as you remove them. After another three to four days make another count. If you had 100 seeds, the number of seedlings removed equals the percentage germination.
- You can distinguish hard or firm (dormant) seeds from dead seeds by pushing down on each non-germinated seed with the flat part of a pencil eraser. If the seed does not flatten with gentle pressure, it is considered hard. Dead seed will usually be moldy at the end of the test.

**A.5. Characteristics of good grass and legume stands.**

Plant Species	Seedlings (no./sq ft)
Cool-Season Grasses <sup>a</sup>	
Orchardgrass Tall Fescue	70 to 100 living in November 40 to 60 living in November
Warm-Season Grasses	
Pearl Millet Sorghum-sudan	15 to 25 living after 1 month 15 to 25 living after 1 month
Mixtures	
Orchardgrass/Ladino Clover Tall Fescue/Ladino Clover	20 to 35 ladino and 35 to 55 orchardgrass living in November 20 to 35 of each species living in November
Alfalfa	

Age of Stand (months)	Minimum Number of Plants to Keep Stand	Desirable Number of Plants for Good Production
	Plants (no./sq ft)	
3 to 6	10 <sup>b</sup>	50 or more
12	10 <sup>b</sup>	25 or more
24	10	15 or more
36	5 to 8	10 or more
48 or more	3 to 5	

**Notes:**<sup>a</sup> Assumes an autumn planting date.<sup>b</sup> These figures will eventually result in satisfactory stands; however, yields will be low during the first season as weeds encroach.